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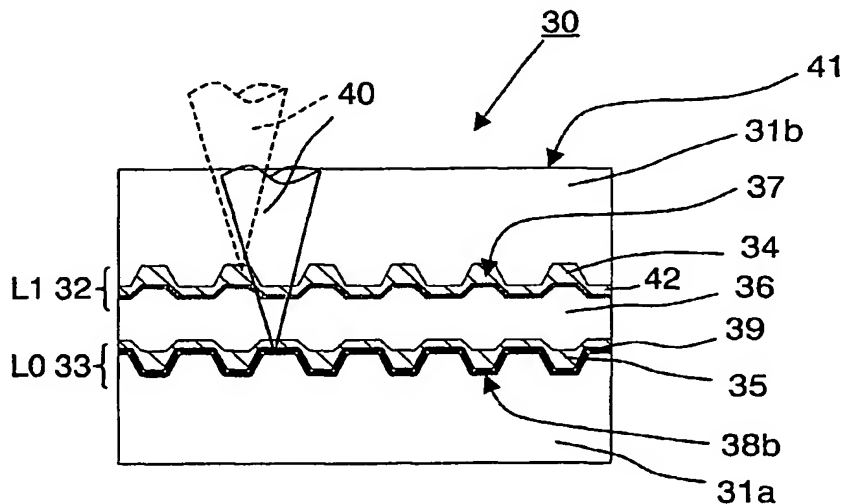
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[Continued on next page]

(54) Title: MULTI-STACK OPTICAL DATA STORAGE MEDIUM AND USE OF SUCH MEDIUM



(57) Abstract: A multi-stack optical data storage medium (30) for recording using a focused radiation beam (40) having a wavelength  $\lambda$  and entering through an entrance face (41) of the medium (30) is described. It has a first substrate (31a) with present on a side thereof a first recording stack (33) named L0, comprising a recordable type L0 recording layer (35), and formed in a first L0 guide groove (38). The L0 recording layer (35) has a thickness  $dL0G$  in the groove (38) and a thickness  $dL0L$  adjacent the groove (38). A second substrate (31b) has present on a side thereof a second recording stack (32) named L1 comprising a recordable type L1 recording layer (34). The L1 recording layer has a thickness  $dL1G$  in the groove and a thickness  $dL1L$  adjacent the groove. The second recording stack (32) is present at a position closer to the entrance face (41) than the L0 recording stack (33) and is formed in a second L1 guide groove (37). The depth of the first L0 guide groove (38) is smaller than  $0.15\lambda$  and  $dL0L$  is substantially equal to or larger than  $dL1G$  by which it is achieved that the L0 stack (33) has a reflection level and a modulation level of recorded marks compatible with the dual layer DVD-ROM specification.

WO 2004/021336 A3



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**A. CLASSIFICATION OF SUBJECT MATTER**  
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**B. FIELDS SEARCHED**

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Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

| Category * | Citation of document, with indication, where appropriate, of the relevant passages  | Relevant to claim No. |
|------------|---|-----------------------|
| X          | WO 96 31875 A (MATSUSHITA ELECTRIC IND CO LTD) 10 October 1996 (1996-10-10)<br>abstract<br>page 29, line 26 -page 32, line 25; figure 20; example 6   | 1-3                   |
| Y          |   | 4-9                   |
| Y          | EP 1 067 535 A (PIONEER CORP)<br>10 January 2001 (2001-01-10)<br>cited in the application<br>abstract<br>paragraph '0018!<br>paragraph '0021!<br>paragraph '0033!<br>paragraph '0041! - paragraph '0042!;<br>figure 2 | 4-9                   |
|            | ---<br>-/--   |                       |

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☒ Patent family members are listed in annex.

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                                     | Relevant to claim No. |
|------------|--|-----------------------|
| A          | EP 0 658 887 A (IBM)<br>21 June 1995 (1995-06-21)<br>page 5, line 34 -page 6, line 35; tables<br>1-8<br>abstract       | 1-3                   |
| A          | US 5 776 656 A (KITAGAWA SUMIKO ET AL)<br>7 July 1998 (1998-07-07)<br>column 6, line 50 -column 8, line 48<br>abstract | 1-4                   |

## INTERNATIONAL SEARCH REPORT

PCT/IB 03/03760

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|---|---------------------|----------------------------|---------------------|
| WO 9631875                                | A | 10-10-1996          | CN 1157048 A               | 13-08-1997          |
|   |   |                     | DE 69630429 D1             | 27-11-2003          |
|   |   |                     | EP 1213709 A1              | 12-06-2002          |
|   |   |                     | EP 1217617 A1              | 26-06-2002          |
|   |   |                     | EP 0764323 A2              | 26-03-1997          |
|   |   |                     | WO 9631875 A2              | 10-10-1996          |
|   |   |                     | JP 10505188 T              | 19-05-1998          |
|   |   |                     | KR 248096 B1               | 15-03-2000          |
|   |   |                     | SG 74605 A1                | 22-08-2000          |
|   |   |                     | SG 74034 A1                | 18-07-2000          |
|   |   |                     | US 2002150032 A1           | 17-10-2002          |
|   |   |                     | US 2003206504 A1           | 06-11-2003          |
|   |   |                     | US 6226239 B1              | 01-05-2001          |
|   |   |                     | US 6434095 B1              | 13-08-2002          |
|   |   |                     | US 5764619 A               | 09-06-1998          |
|   |   |                     | US 6027594 A               | 22-02-2000          |
| EP 1067535                                | A | 10-01-2001          | JP 2001023237 A            | 26-01-2001          |
|   |   |                     | EP 1067535 A2              | 10-01-2001          |
| EP 0658887                                | A | 21-06-1995          | CA 2134140 A1              | 16-06-1995          |
|   |   |                     | CN 1112272 A ,B            | 22-11-1995          |
|   |   |                     | DE 69423080 D1             | 30-03-2000          |
|   |   |                     | DE 69423080 T2             | 14-09-2000          |
|   |   |                     | EP 0658887 A1              | 21-06-1995          |
|   |   |                     | JP 7201077 A               | 04-08-1995          |
|   |   |                     | KR 162122 B1               | 15-12-1998          |
|   |   |                     | SG 43793 A1                | 14-11-1997          |
|   |   |                     | US 5449590 A               | 12-09-1995          |
| US 5776656                                | A | 07-07-1998          | JP 3041230 B2              | 15-05-2000          |
|   |   |                     | JP 9131968 A               | 20-05-1997          |
|   |   |                     | JP 9323478 A               | 16-12-1997          |
|   |   |                     | JP 9099642 A               | 15-04-1997          |
|   |   |                     | US 5679430 A               | 21-10-1997          |